Fate mapping of human embryonic stem cells by teratoma formation.

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Public Summary:

Scientific Abstract:
Human embryonic stem cells (hESCs) have an unlimited capacity for self-renewal, and the ability to differentiate into cells derived from all three embryonic germ layers. Directed differentiation of hESCs into specific cell types has generated much interest in the field of regenerative medicine (e.g., (2-5)), and methods for determining the in vivo fate of selected or manipulated hESCs are essential to this endeavor. We have adapted a highly efficient teratoma formation assay for this purpose. A small number of specifically selected hESCs is mixed with undifferentiated wild type hESCs and Phaseolus vulgaris lectin to form a cell pellet. This is grafted beneath the kidney capsule in an immunodeficient mouse. As few as 2.5 x 10(5) hESCs are needed to form a 16 cm(3) teratoma within 8-12 weeks. The fate of the originally selected hESCs can then be determined by immunohistochemistry. This method provides a valuable tool for characterizing tissue-specific reagents for cell-based therapy.